Exercises

Consider the assembly code which the compiler generates for a C function. Explain what each assembly instruction does and describe what data is in the register.

1. ;;;5 void fn(int8\_t \* a, int32\_t \* b, float \* c) {

000000 b5f0 PUSH {r4-r7,lr}

1. 000002 b085 SUB sp,sp,#0x14
2. 000004 4604 MOV r4,r0
3. 000006 460d MOV r5,r1
4. 000008 4616 MOV r6,r2
5. ;;;6 volatile int8\_t a1, a2;

;;;7 volatile int32\_t b1, b2;

;;;8 volatile float c1, c2;

;;;9

;;;10 a1 = 15;

00000a 270f MOVS r7,#0xf

1. ;;;11 a2 = -14;

00000c 200d MOVS r0,#0xd

1. 00000e 43c0 MVNS r0,r0
2. 000010 9004 STR r0,[sp,#0x10]
3. ;;;12 \*a = a1\*a2;

000012 9804 LDR r0,[sp,#0x10]

1. 000014 4378 MULS r0,r7,r0
2. 000016 b240 SXTB r0,r0
3. 000018 7020 STRB r0,[r4,#0]
4. ;;;13

;;;14 b1 = 15;

00001a 200f MOVS r0,#0xf

1. 00001c 9003 STR r0,[sp,#0xc]
2. ;;;15 b2 = -14;

00001e 200d MOVS r0,#0xd

1. 000020 43c0 MVNS r0,r0
2. 000022 9002 STR r0,[sp,#8]
3. ;;;16 \*b = b1\*b2;

000024 9902 LDR r1,[sp,#8]

1. 000026 9803 LDR r0,[sp,#0xc]
2. 000028 4348 MULS r0,r1,r0
3. 00002a 6028 STR r0,[r5,#0]
4. ;;;17

;;;18 c1 = 15;

00002c 4809 LDR r0,|L1.84|

1. 00002e 9001 STR r0,[sp,#4]
2. ;;;19 c2 = -14;

000030 4809 LDR r0,|L1.88|

1. 000032 9000 STR r0,[sp,#0]
2. ;;;20 \*c = c1\*c2;

000034 9900 LDR r1,[sp,#0]

1. 000036 9801 LDR r0,[sp,#4]
2. 000038 f7fffffe BL \_\_aeabi\_fmul
3. 00003c 6030 STR r0,[r6,#0]
4. ;;;21

;;;22 }

00003e b005 ADD sp,sp,#0x14

1. 000040 bdf0 POP {r4-r7,pc}